Claims

What is claimed is:

1. 1. A calibration database stored in a computer readable medium, said
   2. database comprising:

   3. (a) information elements describing at least one functional
   4. performance characteristic of respective structural features on a
   5. substrate, and

   6. (b) information elements describing feedback from said respective
   7. structural features as a function of position over each of said
   8. respective structural features.

1. 2. The calibration database of claim 1 further comprising:

   2. (c) information elements describing physical analysis of each of said
   3. respective structural features.

1. 3. The calibration database of claim 1 wherein said feedback comprises
   2. secondary electron emission from said structural features upon exposure
   3. to a scanning electron beam.

1. 4. The calibration database of claim 1 wherein said structural features are
   2. holes in a resist layer on said substrate.

1. 5. The calibration database of claim 4 wherein said functional performance
   2. characteristic is a response of each respective hole to an etching protocol.

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6. A method for evaluation of target structural features on a substrate, said method comprising:

(a) providing a calibration database comprising:

(i) information elements selected from the group consisting of (A) information elements describing a functional performance characteristic of respective reference structural features on a substrate, and (B) information elements describing a physical characteristic of each of said respective reference structural features, or both types of information elements, and

(ii) information elements describing feedback from said respective reference structural features as a function of position over each of said respective reference structural features,

(b) providing at least one weighting function as a function of position over each of said respective reference structural features and at least one correlation function as a function of position over each of said respective reference structural features, wherein a plurality of weighting functions and/or correlation functions is provided,

(c) determining a combination of weighting function and correlation function from said provided which provide a desired degree of correlation between said information elements (i) and (ii) for respective reference structural features,

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24 (d) providing information elements describing feedback from said

25   target structural features as a function of position over each of said

26   respective target structural features on said substrate, and

27 (e) applying said combination of weighting function and correlation

28   function to said target structural feature information elements to

29   predict said functional performance characteristic of respective

30   target structural features and/or to describe said physical

31   characteristic of respective target structural features.

1 7. The method of claim 6 wherein a plurality of weighting functions and a

2   plurality of correlation functions are provided in step (b).

1 8. The method of claim 6 wherein said weighting functions are selected from

2   the group consisting of continuous functions and discontinuous functions.

1 9. The method of claim 6 wherein a value of said weighting function of said

2   determined combination of step (c) is multiplied with a value of a

3   respective information element in step (e).

1 10. The method of claim 6 wherein said calibration database includes

2   information elements describing a functional performance characteristic of

3   respective reference structural features on a substrate, and said

4   functional performance characteristic is predicted in step (e).

1 11. The method of claim 10 wherein said functional performance

2   characteristic is the etchability across said target feature.

1   12.   The method of claim 6 wherein said structural features are holes in a

2   resist layer on said substrate.

1   13.   The method of claim 12 wherein said functional performance

2   characteristic is a response of each respective hole to an etching protocol.

1   14.   The method of claim 6 wherein all of said information elements are

2   embodied in a computer-readable medium and steps (c) and (e) are

3   performed using a computer.

1   15.   The method of claim 6 wherein said feedback of steps (a) and (e)

2   comprises secondary electron emission from said structural features upon

3   exposure to a scanning electron beam.

1   16.   The method of claim 6 wherein steps (c) and (e) include performance of

2   linear regression analysis.

1   17.   A method for evaluation of target structural features on a substrate, said

2   method comprising:

3   (a)   providing information elements describing feedback from said

4   target structural features as a function of position over each of said

5   respective target structural features on said substrate,

6   (b)   applying a combination of a weighting function and a correlation

7   function to said target structural feature information elements to

8   predict a functional performance characteristic of respective target

9   structural features and/or to describe a physical characteristic of

10   respective target structural features.

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1   18.   The method of claim 17 wherein a value of said weighting function is
2   multiplied with a value of a respective information element in step (b).

1   19.   The method of claim 17 wherein a functional performance characteristic is
2   predicted in step (b).

1   20.   The method of claim 19 wherein said functional performance
2   characteristic is the etchability across said target feature.

1   21.   The method of claim 17 wherein said structural features are holes in a
2   resist layer on said substrate.

1   22.   The method of claim 21 wherein said functional performance
2   characteristic is a response of each respective hole to an etching protocol.

1   23.   The method of claim 17 wherein all of said information elements are
2   embodied in computer-readable media and steps (c) and (e) are
3   performed using a computer.

1   24.   The method of claim 17 wherein said feedback comprises secondary
2   electron emissions from said structural features upon exposure to a
3   scanning electron beam.

1   25.   A system for evaluation of target structural features on a substrate, said
2   system comprising:

3   (a)   a calibration database in a computer-readable medium, said
4   database comprising:
5   (i)   information elements selected from the group consisting of

6   information elements describing a functional performance

7   characteristic of respective reference structural features on a

8   substrate and information elements describing physical

9   analysis of each of said respective reference structural

10   features, and

11   (ii)   information elements describing feedback from said

12   respective structural features as a function of position over

13   each of said respective reference structural features,

14   (b)   information elements in a computer-readable medium

15   corresponding to at least one weighting function as a function of

16   position over each of said respective reference structural features,

17   and at least one correlation function as a function of position over

18   each of said respective reference structural features, wherein a

19   plurality of weighting functions and/or correlation functions is

20   provided,

21   (c)   means for determining a combination of weighting function and

22   correlation function from said provided which provide a desired

23   degree of correlation between said information elements (i) and (ii)

24   for respective reference structural features,

25   (d)   information elements in a computer-readable medium describing

26   feedback from said target structural features as a function of

27   position over each of said respective target structural features on

28   said substrate,

29   (e)   means for applying said combination of weighting function and

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30   correlation function to said target structural feature information

31   elements to predict said functional performance characteristic of

32   respective target structural features and/or to describe said

33   physical characteristic of respective target structural features.

1   26.   The system of claim 25 wherein said means (c) comprises executable

2   code stored in a computer readable medium and a computer capable of

3   executing said code.

1   27.   The system of claim 25 wherein said means (e) comprises executable

2   code stored in a computer readable medium and a computer capable of

3   executing said code.

1   28.   An apparatus for evaluation of target structural features on a substrate,

2   said apparatus comprising:

3   (a)   information elements in a computer-readable medium describing

4   feedback from said target structural features as a function of

5   position over each of said respective target structural features on

6   said substrate,

7   (b)   means for applying a combination of weighting function and

8   correlation function to said target structural feature information

9   elements to predict a functional performance characteristic of

10   respective target structural features and/or to describe a physical

11   characteristic of respective target structural features.

1   29.   The apparatus of claim 28 further comprising means for obtaining said

2   information elements.

1 30. The apparatus of claim 29 wherein said means for obtaining said
2   information elements includes a scanning electron beam.

1 31. A computer program stored in a computer-readable medium, said
2   program performing a method of evaluating target structural features on a
3   substrate, said method comprising:
4   (a)   creating a calibration database comprising:

5   (i)   information elements selected from the group consisting of
6   (A) information elements describing a functional
7   performance characteristic of respective reference structural
8   features on a substrate, and (B) information elements
9   describing a physical characteristic of each of said
10   respective reference structural features, or both types of
11   information elements, and

11   (ii)   information elements describing feedback from said
12   respective reference structural features as a function of
13   position over each of said respective reference structural
14   features,

15   (b)   providing at least one weighting function as a function of position
16   over each of said respective reference structural features and at
17   least one correlation function as a function of position over each of
18   said respective reference structural features, wherein a plurality of
19   weighting functions and/or correlation functions is provided,

20   (c)   determining a combination of weighting function and correlation

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21 function from said provided which provide a desired degree of

22 correlation between said information elements (i) and (ii) for

23 respective reference structural features,

24 (d) obtaining information elements describing feedback from said

25 target structural features as a function of position over each of said

26 respective target structural features on said substrate, and

27 (e) applying said combination of weighting function and correlation

28 function to said target structural feature information elements to

29 predict said functional performance characteristic of respective

30 target structural features and/or to describe said physical

31 characteristic of respective target structural features.

1 32. A computer program stored in a computer-readable medium, said

2 program performing a method of evaluating target structural features on a

3 substrate, said method comprising:

4 (a) obtaining information elements describing feedback from said

5 target structural features as a function of position over each of said

6 respective target structural features on said substrate,

7 (b) applying a combination of a weighting function and a correlation

8 function to said target structural feature information elements to

9 predict a functional performance characteristic of respective target

10 structural features and/or to describe a physical characteristic of

11 respective target structural features.